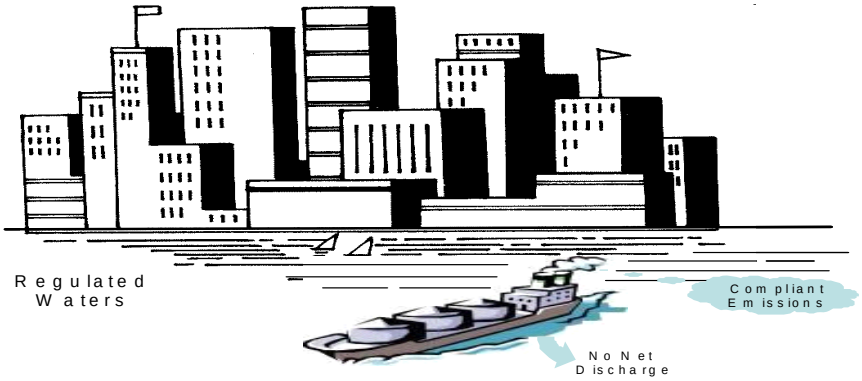
AFeCT@SEA

Ammonia Free e-SCRUB™ High Energy Electron Scrubbing for Oil-fired Sea Fairing Vessels

Executive Summary

AFeCT - Ammonia Free e-SCRUB™ Clean Technologies

ePC has license rights on the ammonia free e-SCRUB™ high-energy electron clean technology (AFeCT) designed for oil-fired sea fairing vessels looking for an efficient multi-pollutant air pollution control system that doesn't require use of ammonia and by-product disposal. The patent is shared with the A. P. Moller – Maersk Company, the largest shipping corporation in the world.



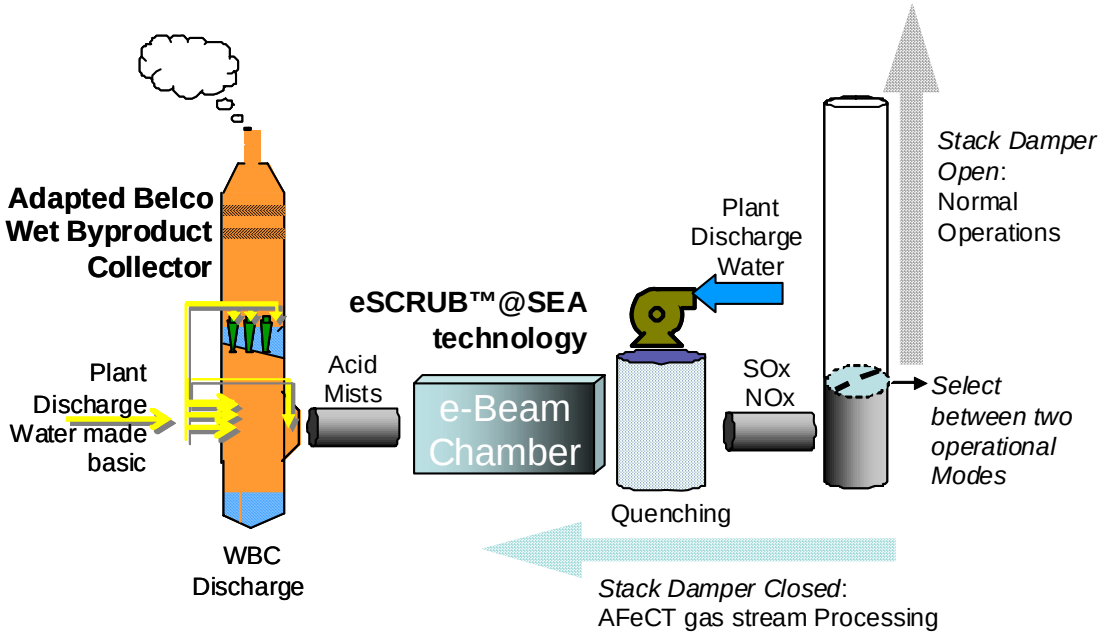
This integrated technology reduces air pollution by removing approximately 90-95% of sulfur dioxide, 60-70% of nitrogen oxides and more than 95% of particulate (PM 10 & 2.5) emissions. AFeCT has no net discharge and far outperforms competing technologies such as SCR. It also eliminates the need to install different pieces of equipment to treat various pollutants simultaneously.

eSCRUB Power & Capital Inc.
Email: pgenuario@epowercap.com
Web Site: www.epowercap.com

Version 1.0, 08/08

Design Features

AFeCT fuses the e-SCRUB™ high-energy electron scrubbing technology with an adapted version of Belco Technologies Corporation's Wet Byproduct Collector (WBC). A traditional Wet By-Product Collector's large size is difficult to use on ocean going vessels but the adapted version is ideal for such applications.



AFeCT is an integration of the eSCRUB™ patented electron beam technology with an adapted version of Belco's Wet Byproduct Collector (WBC). As depicted above, the gas stream is routed to AFeCT from the main stack. This enables plant to use either AFeCT or their existing stack during operations effectively creating operational independence between AFeCT and the boiler. The gas stream is first hydrated with the plant's discharge water. Once in the e-beam chamber, the water vapor, hydrolyzed through radiolysis oxidizes the NOx and SOx to form associated acid mists. Belco's WBC, which is uniquely designed for cleaning gases with such properties, removes the acids and particulate matter using seawater. The scrubbing capacity can easily match the output of the unit(s) being serviced.

AFeCT Performance

Emission Reductions

- SO_2: Up to 90%
- NO_x: Up to 70%
- PM 10 & 2.5: 95% removed
- CO_2: No increase
- Discharge: no net

The e-SCRUB™ process uses electrons, which are generated from a patented high energy electron beam generator as a catalyst to remove pollutants. Seawater is used by the Belco Units. AFeCT removes up to 90% of SO_2, up to 70% NO_x (up to 90% when used with low NO_x burners), and 95% of fine particulates.

AFeCT produces negligible amounts of N_2O and no additional CO_2 when removing pollutants from the gas stream. Comparatively, a SCR converts almost 50% of the NO it removes into N_2O, which has a far greater greenhouse effect than CO_2 or NO.

The e-SCRUB™@SEA high-energy electron scrubbing technology has an additional advantage in that it does not clog when ships use higher sulfur fuels.

Cost Effective Compliance

Under various national and international laws and regulations, selected ocean going vessels are prohibited in releasing SOx, NOx, and particulate matter into the air within a specified distance from land (i.e. 50 nm) above a certain threshold. Compliance by burning fuel that is low in components that generate SOx and particulate matter in flue gases is generally expensive. Incorporation of scrubbers offers a viable alternative to achieve emission compliance while allowing the use of cheaper fuels.

AFeCT eliminates the need to install different pieces of equipment to treat various pollutants simultaneously. This is one reason why AFeCT is less expensive and more efficient than alternative APC technologies and yields more return on investment.